MACHINE DESIGN

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Including 24 regular issues of MACHINE DESIGN plus five special issues—*The Materials Reference Issue, Electric Motors & Controls Reference Issue, Mechanical Drives, Bearings & Seals Reference Issue, Fluid Power Reference Issue, Fastening & Joining Reference Issue.* Only articles and editorial items one-half page or larger are indexed.

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2. Author's last name (see Author Index for complete name). Departments in regular issues are denoted by the following code:
   - NT ..... News/Trends
   - DI ..... Design International
   - Scan ..... Scanning the Field for New Ideas
3. Date of issue, MACHINE DESIGN *Reference Issues* are denoted by the following code:
   - Ma ..... Materials (Mar. 4)
   - EM&C ..... Electric Motors & Controls (Apr. 29)
   - MD ..... Mechanical Drives, Bearings & Seals (June 3)
   - FP ..... Fluid Power (Sept. 30)
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Current Sensor Remembers to Turn Off the Power ..... Scan 6/26 32 (0.5)
No Letter Bomb Gets By New High-Speed Detector ..... N/T 10/2 4 (0.8)
Laser Looks at Air to Detect Turbulence Scan 11/13 53 (0.5)
Timers ..... Chapter EM&C 4/24 150 (2.0)
Miniaturizing With Timers on a Chip .. Frostholm 7/10 78 (4.0)
Circuit Cuts Cost of Time Base Expansion Scan 8/21 34 (0.6)
Synchronous Motors ..... Chapter EM&C 4/24 18 (3.0)
Instrument Motors ..... Chapter EM&C 4/24 64 (1.4)
CCDs Simplify Complex Electronics .... Article 3/20 89 (1.0)
Electronic Counters ..... Chapter EM&C 4/24 156 (0.7)
Electromechanical Counters ..... Chapter EM&C 4/24 158 (1.0)
Record Bit Density of FET Memory Chip N/T 6/26 12 (0.5)
Instruments That Think For Themselves Comella 6/26 50 (5.0)
Electronic "Cam" Gets Rid of Mechanical Linkages ..... Scan 10/16 56 (1.0)
Putting Data from Mars on 'HOLD' .... Zimmerman 11/13 36 (3.0)
Arctic Ice Flow Measurements to Tip Off Where to Locate Oil Rigs, Pipelines N/T 12/11 8 (0.8)
Single Stylus Traces Two Signals on Chart Paper ..... Scan 12/11 45 (0.5)
Laser Interferometers ..... Koch 2/20 92 (6.0)
Simple Circuit Watches Voltage Level .. Scan 3/20 41 (0.5)
Electronic Vernier Accurately Measures Frequency ..... Scan 6/12 43 (0.5)
Simpler Tuning for Wien-Bridge Oscillators ..... Brokaw 9/4 78 (0.8)
Superaccelerators: Servomotors with Instant Reflexes ..... Sohlberg 1/23 101 (6.0)
AC Servomotors ..... Chapter EM&C 4/24 62 (1.0)
Stepper Motors ..... Chapter EM&C 4/24 66 (2.0)
Stepper Motors Aren't All Alike ..... Irani & Morreale 6/12 120 (2.0)
Driving Inertial Loads With Stepper Motors ..... Article 8/7 85 (0.7)
Stepper Drive Counts Its Pulses for Smooth Stops ..... Scan 11/13 48 (1.0)

15, 16. Circuit Components, Connectors & Wiring

Transient Suppression—Don't Make The Cure Worse Than the Disease ..... Kay 2/6 82 (4.0)
Extra Resistor Wipes Out Temperature Reading Errors ..... Scan 5/15 31 (0.5)
Dual Photosensors Keep Contactless Pot Accurate ..... Scan 10/2 36 (0.7)
Laser Pulses Make Connections on IC Chips ..... N/T 1/9 18 (0.7)
Optical "Cam" Keeps an Eye on Shaft Position ..... Scan 2/6 41 (0.5)
Build Your Own Precision Logic Probe .. Scan 2/20 46 (0.6)
CCDs Simplify Complex Electronics .... Article 3/20 89 (1.0)
Solid-State Switching Devices ..... Chapter EM&C 4/24 162 (8.6)
Digital Control Modules ..... Chapter EM&C 4/24 170 (6.3)
Simple Circuit Keeps Polarity Straight.. Scan 5/15 29 (0.5)
Okay, Let's Go Electronic! ..... Leonard 5/29 36 (6.0)
The Final Connection: Sockets or Solder? Gove 6/26 39 (3.0)
Instruments That Think For Themselves Comella 6/26 50 (5.0)
Miniaturizing With Timers on a Chip ... Frostholm 7/10 78 (4.0)
Electronic Systems As Machine Elements Leonard 8/21 54 (6.0)
Bucket Brigade Cuts Cost of Waveform Analysis ..... Scan 9/18 46 (0.7)
Bargain-Priced Burn-Out Protection .... Scan 7/24 32 (0.7)
How To Interface Power Supplies ..... Skopal 9/4 60 (4.0)
Laser Pulses Make Connections on IC Chips ..... N/T 1/9 18 (0.7)
Laser Interferometers ..... Koch 2/20 92 (6.0)
Three Lasers in a Cane Provide Eyes for the Blind ..... N/T 3/20 10 (1.3)
Waveguide Laser Finds a Manufacturing Job ..... N/T 6/12 6 (0.5)
Laser Looks at Air to Detect Turbulence Scan 11/13 53 (0.5)
Connecting Devices ..... Chapter EM&C 4/24 198 (1.6)
Porosity Problems Solved for Formed Electrical Contacts ..... N/T 1/23 8 (0.5)
Circuit Stops Contact Bounce, Uses Less Power ..... Scan 5/29 32 (0.6)
Laser Pulses Make Connections on IC Chips ..... N/T 1/9 18 (0.7)
Selective Cladding Cuts Connector Costs 66% ..... N/T 1/23 18 (0.5)
Optical "Cam" Keeps an Eye on Shaft Position ..... Scan 2/6 41 (0.5)
The Final Connection: Sockets or Solder? Gove 6/26 39 (3.0)
Wrap-Around Connector Speeds Pressure Testing ..... Scan 12/11 48 (0.5)
The New Look in Wiring Hardware .... Fryberger 3/20 70 (4.0)
Flexible Cable Promises New Jobs For Superconductors ..... N/T 5/29 8 (0.8)
How To Interface Power Supplies ..... Skopal 9/4 60 (4.0)
Record Set in Cryogenic Power Transmission ..... N/T 9/18 4 (1.0)
Optical "Cam" Keeps an Eye on Shaft Position ..... Scan 2/6 41 (0.5)
Many PCB Production Problems Solved by Dry Processing ..... N/T 11/13 6 (0.8)
Electronic Assembly: In-House or Subcontract? ..... Leonard 11/13 122 (6.0)
Flexible Cable Promises New Jobs For Superconductors ..... N/T 5/29 8 (0.8)

17. Miscellaneous Components

Magnetic Float Measures Flow Rate ... Scan 3/20 39 (0.5)
Lever-Arm Motor Delivers High Torque, Saves Energy ..... Scan 6/26 28 (0.7)
Gaskets That Block EMI ..... Severinsen 8/7 74 (4.0)
Magnetic Field Lets Plasma Torch Tackle New Jobs ..... Scan 10/16 60 (0.5)
Hall-Effect Sensors—Magnetic Switches That Have No Contacts ..... Brockman & Nelson 10/16 123 (5.0)
High-Density Magnets Cut Motor Weight, Boost Performance ..... Scan 11/13 50 (0.7)
Ceramic Holding Magnets ..... Place 11/13 119 (3.0)
Foil Strips Make Reliable, Inexpensive Keyboard ..... Scan 2/6 42 (0.6)
Powder Insulation Bids for All Magnet-Wire Coating Jobs ..... N/T 1/9 10 (1.3)
Gaskets That Block EMI ..... Severinsen 8/7 74 (4.0)
Record Set in Cryogenic Power Transmission ..... N/T 9/18 4 (1.0)
Fiber Optics: New Developments Bring New Appeal ..... Aronson 4/17 81 (5.0)
Fiber Optics Impresses the Air Force .. N/T 6/12 4 (1.0)
Magnetic Field Lets Plasma Torch Tackle New Jobs ..... Scan 10/16 60 (0.5)
RF and Laser Combine to Produce High-Energy Beam ..... Scan 11/27 34 (1.0)
Clutch and Brake Motors ..... Chapter EM&C 4/24 58 (2.0)
Safer Power-Tool Braking ..... Gross 5/15 72 (4.0)
Mechanical Systems: Driveline Components—Electric Clutches ..... Chapter MD 6/19 30 (2.7)
Mechanical Systems: Driveline Components—Electric Brakes ..... Chapter MD 6/19 38 (0.6)
Variable-Torque Brakes Take Up the Slack in Spooled Materials ..... Kaplan 11/13 136 (4.0)
Ignition System Approved as Explosion Proof ..... N/T 1/23 8 (0.5)
Electronic Ignition ..... Florio 3/6 73 (5.0)
Superlean Auto-Engine Mixture Fired by Torch ..... N/T 3/20 4 (0.7)
Chrysler's 'Electronic' Lean-Burn Engine N/T 7/10 24 (3.0)
Dual Photosensors Keep Contactless Pot Accurate ..... Scan 10/2 36 (0.7)

19. Systems & Assemblies

Inexpensive Amplifier Rejects Common Mode Noise ..... Scan 1/9 42 (0.5)
Semiconductors Bridle DC Motors ..... Scan 2/20 45 (0.5)
Shaft Encoder Circuit Reads in Noisy Atmospheres ..... Scan 4/17 38 (0.5)
Machine Controllers ..... Chapter EM&C 4/24 190 (2.7)
Okay, Let's Go Electronic! ..... Leonard 5/29 36 (6.0)
Instruments That Think For Themselves Comella 6/26 50 (5.0)
F-16: First With Fly-By-Wire ..... Wise 8/7 16 (5.0)
Controls Are Getting Smarter ..... Cleveland 8/7 70 (4.0)
Electronic Systems As Machine Elements Leonard 8/21 54 (6.0)
Electronic "Cam" Gets Rid of Mechanical Linkages ..... Scan 10/16 56 (1.0)
Transaction Telephone: One Step Closer to the No-Cash, No-Cheat Society .. N/T 1/23 10 (0.6)

Instruments That Think For Themselves	Comella	6/26	50	(5.0)
New Tools for Old Tasks: Calculators..	Sperry	12/11	143	(3.0)
New Tools for Old Tasks: Computers ..	Courtemanche	12/11	146	(3.0)
Choosing A DC-Motor Drive	Harris & Morgan	1/9	113	(1.3)
Choosing an AC Motor Drive	Harris & Morgan	3/6	92	(1.6)
Power-Control Modules	Chapter	EM&C 4/24	178	(1.6)
Motor Control Package Simplifies Electronics	Scan	7/10	37	(0.7)
Germany's Electric Scooters	Heumann	9/4	20	(1.5)
Analyzing Do-It-Yourself Servosyst.ms..	Maskrey	4/17	92	(6.0)

FLUID POWER

21, 22, 23. Fluids, Fluid Conditioners, Fluid Conductors

Fluids, Conductors, and Conditioners: Finding the Right Hydraulic Fluid..	Chapter	FP 9/11	86	(2.0)
Controlling Aerosols With Oil-less Cylinders	Boulden	1/9	95	(5.0)
Carbon Dioxide: An Aerosol Propellant Solution	N/T	8/21	10	(0.7)
How Seals Act At High Temperatures...	Chapter	FP 9/11	189	(1.0)
Pressure Distorts Cylinders Where You Least Expect It	Blake	2/6	90	(1.4)
The Truth About Reservoirs	Chapter	FP 9/11	10	(1.0)
Bump and Shake Keeps Filter Tube on the Job	Scan	3/6	38	(0.6)
Explosion Shocks Dirt Off Filter	Scan	5/29	31	(0.7)
Hydraulic and Pneumatic Filters	Chapter	FP 9/11	103	(1.5)
Elements and Housings of Hydraulic Filters	Chapter	FP 9/11	106	(0.6)
Improved Regenerators Ready for Testing in Auto Turbines	N/T	2/6	10	(0.7)
Heat Pipes Save Energy in Building Air Conditioner	N/T	2/20	4	(0.5)
Air-Only Air Conditioner Surprises Auto Makers	N/T	3/6	10	(1.2)
Cheap and Acceptable Cooling System Readied for Generating Plants	N/T	7/10	28	(0.5)
Heat Exchangers for Hydraulic Systems	Chapter	FP 9/11	100	(1.0)
Which Type of Heat Exchanger?	Chapter	FP 9/11	102	(0.7)
High-Pressure Hydraulics	Article	5/1	89	(1.3)
Fuel Vaporizer Cuts Auto Emissions ...	Scan	7/24	30	(0.5)
Keeping the Water Out of Pneumatic Components	Chapter	FP 9/11	107	(1.0)
Fundamentals of Hydraulic Line Selection	O'Sickey	5/15	68	(3.0)
Designing Lightweight Frames	Marshek & Rosenberg	5/15	88	(1.0)
Pipe and Tubing	Chapter	FP 9/11	97	(0.7)
Tubing Fittings	Chapter	FP 9/11	97	(0.7)
Guidelines for Selecting Hydraulic Tubing	O'Sickey	9/18	102	(4.0)
Selecting Hydraulic Hose	Chapter	FP 9/11	90	(0.7)
Insulation Installers Readied for Trans-Alaskan Pipeline	N/T	4/3	8	(0.7)
Fundamentals of Hydraulic Line Selection	O'Sickey	5/15	68	(3.0)
Guidelines for Selecting Hydraulic Pipe..	O'Sickey	8/7	78	(2.0)
Pipe and Tubing	Chapter	FP 9/11	97	(0.7)
Finding the Right Hose Fitting	Chapter	FP 9/11	91	(0.9)
Tubing Fittings	Chapter	FP 9/11	97	(0.7)
Cone Solves Material Problem	Scan	4/17	40	(0.5)
Mechanical Systems: Driveline Components—Couplings	Chapter	MD 6/19	41	(3.0)
Quick-Disconnect Couplings	Chapter	FP 9/11	92	(0.7)
Three-Piece Seal Fills in Flange-Face Faults	Scan	10/16	61	(0.5)
High-Pressure Hydraulics	Article	5/1	89	(1.3)
Turbo-Action Muffler Hushes Exhaust Noise	Scan	5/15	28	(0.5)
Pulsed Air Checks Back-Flow in Metering Head	Scan	10/2	38	(0.5)

24. Linear Devices

Quiet "Blast" Moves Stubborn Materials	Scan	4/3	47	(0.6)
Binary Cylinders Step Up Positioning Speed	Scan	1/9	42	(0.5)
Controlling Aerosols With Oil-less Cylinders	Boulden	1/9	95	(5.0)
Which Type of Cylinder?	Chapter	FP 9/11	138	(1.5)
A Bad Mount Choice Can Ruin a Good Cylinder	Chapter	FP 9/11	140	(0.8)
If a Little Cylinder Works, Won't A Bigger One Be Better?	Chapter	FP 9/11	140	(1.2)
Tailor the Cylinder to the Gage	Chapter	FP 9/11	142	(0.6)
Crank Smoothes Cylinder Loads	Chapter	FP 9/11	143	(0.8)
How Seals Work in Cylinders	Chapter	FP 9/11	177	(0.5)
Folding Accumulator Element Takes The Best From Bladders and Diaphragms	Scan	3/6	37	(0.6)
Why Use an Accumulator?	Chapter	FP 9/11	14	(0.6)
Choosing The Right Accumulator	Chapter	FP 9/11	18	(1.0)
Picking The Right Booster	Chapter	FP 9/11	20	(0.9)
Circuits for Controlling Hydraulic Actuator Speed	Altland	4/3	152	(3.0)
The Circuit Chooses the Valve	Chapter	FP 9/11	45	(0.7)
Rotary Pneumatic and Hydraulic Actuators	Chapter	FP 9/11	144	(1.0)
Compensators Adjust Flow Delivery	Chapter	FP 9/11	22	(0.6)

25. Rotary Devices

Mini Sales Power Energy Converter	Scan	4/17	36	(1.0)
Geothermal Pump To Tap Deep, Hot Brine	N/T	5/29	12	(0.6)
Whirling Discs Pump Abrasives Without Wear	Scan	8/21	30	(1.0)
What Determines Reliability in Metering Pumps?	Holloway	9/4	66	(3.0)
Power Input and Storage Devices	Chapter	FP 9/11	7	(3.8)
Positive-Displacement Pumps—Which One For You?	Chapter	FP 9/11	208	(1.0)
How Handling Pumps Work	Chapter	FP 9/11	209	(1.0)
The Ins and Outs of Centrifugal Pumps	Chapter	FP 9/11	210	(0.5)
Water Pressure Powers Pump in Emergencies	Scan	11/13	49	(0.6)
Bouncing Gear Powers Hydraulic Motor..	Scan	1/9	36	(1.0)
Which Type of Fluid Motor?	Chapter	FP 9/11	150	(2.0)
High-Torque Hydraulic Motors	Dann	11/27	60	(4.0)
Mini Sales Power Energy Converter	Scan	4/17	36	(1.0)
Mini Sales Power Energy Converter	Scan	4/17	36	(1.0)
Flapping Vanes Deliver High Flows From Small Compressor	Scan	6/12	38	(1.0)
PPS Pistons Show No Visible Wear After Two Years in a Compressor	N/T	9/4	18	(0.5)
How Compressors Work	Chapter	FP 9/11	21	(1.1)
The Circuit Chooses the Valve	Chapter	FP 9/11	45	(0.7)
Rotary Pneumatic and Hydraulic Actuators	Chapter	FP 9/11	144	(1.0)
The Ins and Outs of Centrifugal Pumps	Chapter	FP 9/11	210	(0.5)

26. Seals

Learning the Language of Fluid Seals ..	Chapter	FP 9/11	174	(0.5)
How Seals Work in Cylinders	Chapter	FP 9/11	177	(0.5)
Stretching O-Rings to the Limit	Schoutens	4/3	178	(0.6)
O-Ring and Other Solid Section Seals...	Chapter	FP 9/11	175	(0.7)
Tests Determine One Aircraft Fuel Seal	N/T	11/13	34	(0.5)
Seal's Permanent Wave Saves Shaft Wear	Scan	2/20	45	(0.5)
Radial Shaft Seal Stops Leakage	Scan	4/17	38	(0.5)
Seals that Survive Heat	Field	5/1	76	(4.0)
Mechanical Systems: Seals	Chapter	MD 6/19	252	(12.0)
Integral Support Rings Prevent Seal Extrusion	Scan	7/10	39	(0.5)
Pressure-Energized Seals	Chapter	FP 9/11	176	(1.0)
Flat Spring Loads Seal in Two Directions	Scan	12/11	45	(0.5)
Mechanical Systems: Seals—Nonmetallic Gaskets	Chapter	MD 6/19	280	(4.2)
Gaskets That Block EMI	Severinsen	8/7	74	(4.0)
Mechanical Systems: Seals—Split Ring Seals	Chapter	MD 6/19	274	(1.0)
Mechanical Systems: Seals—Compression Packings	Chapter	MD 6/19	275	(6.0)
Compression Packings and Seals	Chapter	FP 9/11	175	(0.8)
Groovy Shaft Oils Fan Bearing	Scan	1/23	47	(0.6)
Sweeping Action Keeps Rupture Disc Clean	Scan	9/4	36	(0.5)
Rolling Diaphragms That Last	Marchetti	11/27	71	(1.2)

27. Valves

Fluid-Handling Valves	Chapter	FP 9/11	216	(2.0)
Power Modulation and Control Devices: What's Important in Selecting Direction-Control Valves?	Chapter	FP 9/11	38	(1.7)
Balancing Flow Forces in Pneumatic Valves	Logan & Louis	1/9	112	(1.0)
Hair-Trigger Safety Valve Stops Flow Quickly	Scan	6/12	39	(0.7)
Ball Valve Saves Its Seals	Scan	9/4	34	(0.6)
Controlling Flow in Hydraulic Circuits..	Chapter	FP 9/11	44	(1.3)
Eccentric Disc Mount Makes Valve Seal Last Longer	Scan	11/13	53	(0.5)
The Specialized Functions of Hydraulic Pressure Valves	Chapter	FP 9/11	42	(1.0)
Controlling Air Pressure	Chapter	FP 9/11	46	(0.7)
Floating Weight Controls Water Pressure	Scan	10/2	38	(0.5)
Servovalves For Ultimate Accuracy	Chapter	FP 9/11	46	(1.3)
Modular Manifolds Compete With Conventional Conductors	Chapter	FP 9/11	98	(0.5)
Two-Stage Nozzle Adjusts Suction to Fluid Bulk	Scan	2/20	44	(1.0)
Flow Rates For Sharp-Edged Orifices ..	Groesbeck & Manning	6/12	122	(1.5)
Sizing Orifices for Pressure Reduction ..	Myers	8/7	84	(1.3)

MECHANICAL

28. Instruments & Controls

Backward Pinch Valve Keeps an Eye on Pressure	Scan	3/20	36	(0.5)
Magnetic Float Measures Flow Rate	Scan	3/20	39	(0.5)
Measure Flowrate With Pressure Oscillations	Scan	4/3	48	(0.5)
Gaging Fluid System Performance	Chapter	FP 9/11	48	(2.0)
Tailor the Cylinder to the Gage	Chapter	FP 9/11	142	(0.6)
Controlling Flow in Hydraulic Circuits	Chapter	FP 9/11	44	(1.3)
Controlling Air Pressure	Chapter	FP 9/11	46	(0.7)
Floating Weight Controls Water Pressure	Scan	10/2	38	(0.5)
Which Type of MPL?	Chapter	FP 9/11	226	(2.0)
Shifting Winds for Fluidics	Chapter	FP 9/11	228	(1.0)
Simple Circuits for Logic Functions	Chapter	FP 9/11	229	(1.5)
Heat Tracer Automatically Controls Output	Scan	6/26	30	(0.5)

29. Systems & Assemblies

High-Pressure Hydraulics	Article	5/1	89	(1.3)
Finding—and Fixing—Hydraulic Noise Sources	Stecki & Dransfield	11/13	146	(1.2)
Internal Feedback Kills Positioner Deadband	Scan	2/6	40	(1.0)
Hydrostatic Drives	Chapter	FP 9/11	160	(1.0)
Record Set in Cryogenic Power Transmission	N/T	9/18	4	(1.0)
Controlling Aerosols With Oil-less Cylinders	Boulden	1/9	95	(5.0)
Oiler-With-A-Brain Adjusts Flow to Bearing Temperature	Scan	3/20	36	(0.5)
Mechanical Systems: Bearings — Lubricating Systems	Chapter	MD 6/19	216	(3.0)
Lubricating Pneumatic Components	Chapter	FP 9/11	108	(0.5)
Bearings Promised Lifetime Lubrication	N/T	9/18	6	(0.7)
A New Way to Analyze Rotor Stability	Maslo & Rieger	10/2	69	(3.0)
New Motor Heralded as Major Advancement	N/T	10/16	6	(0.5)
Power Units Put It All Together	Chapter	FP 9/11	12	(0.7)

31. Power Sources

Mechanical Systems 1975	Chapter	MD 6/19	2	(6.0)
Justifying the Shift to Electronics	Leonard	10/2	82	(6.0)
RamJet Test Flight Impressive	N/T	1/9	8	(0.5)
Isolating Engine Vibration	Wright	4/17	87	(5.0)
Inlet Redesign Will Help Silence Big Jets	N/T	10/16	10	(0.6)
Present Technology Meets '77 Auto-Emissions Standards	N/T	2/6	8	(0.7)
Superlean Auto-Engine Mixture Fired by Torch	N/T	3/20	4	(0.7)
"New" Pollutant Forces EPA To Revise Auto-Emission Standards	N/T	4/3	4	(0.8)
Mechanical Systems: Driveline Components—Engines	Chapter	MD 6/19	62	(2.0)
Axial Valve Assembly Helps Optimize Engine Performance	Scan	6/26	32	(0.5)
NRC Has Its Say on Auto Emissions and Air Pollution	N/T	7/24	12	(0.7)
Outboard Overview	N/T	7/24	16	(4.0)
New Truck Burns Much Less Fuel	N/T	8/7	12	(0.5)
Exhaust-Gas Turbocharger Boosts Engine Power	Scan	8/7	32	(0.7)
Diesel Option Offered For Light American Vehicles	N/T	9/4	4	(0.7)
Brayton, Stirling Engines To Compete As Automotive Powerplants of the Future	N/T	10/2	12	(0.8)
New Motor Heralded as Major Advancement	N/T	10/16	6	(0.5)
GM Getting Ready For Diesel Auto	N/T	10/16	6	(0.5)
Improved Regenerators Ready for Testing in Auto Turbines	N/T	2/6	10	(0.7)
Bunker C Becoming More Acceptable Marine-Turbine Fuel	N/T	8/7	34	(0.6)
Brayton, Stirling Engines To Compete As Automotive Powerplants of the Future	N/T	10/2	12	(0.8)
Big Water-Cooled Gas Turbine To Operate at 2,800 F	N/T	11/27	10	(0.8)
Nuclear War Not Likely To Wipe Out Life	N/T	11/27	12	(0.5)
Ion Engine Nearly Ready for Work in Space	N/T	7/10	6	(0.7)
'Friendly Enemy' To Receive Tailored Probes	N/T	10/16	12	(0.6)
Garbage Power	Bryson	1/9	20	(6.0)
Oil Shale and Tar Sands Very Much In Energy Ballgame	N/T	2/6	26	(0.8)
Sun-Powered Air Conditioner Studied for New Skyscraper	N/T	4/3	10	(0.7)
Minimizing Oil-Spill Hazards	Zimmerman	5/1	16	(5.0)
New Truck Burns Much Less Fuel	N/T	8/7	12	(0.5)
Bunker C Becoming More Acceptable Marine-Turbine Fuel	N/T	8/7	34	(0.6)
No Letter Bomb Gets By New High-Speed Detector	N/T	10/2	4	(0.8)
Blanket Soaks Up Oil Spills; Microbe Converts Them Into Fish Food	N/T	10/16	4	(1.0)
Courtesy Cars Testing Fuels and Oil	N/T	10/16	8	(0.5)
Hydride Storage Key to Hydrogen-Powered Vehicles	N/T	11/13	4	(1.0)
Accidental Explosions Now Being Typed	N/T	11/13	18	(0.6)
Coming: 50% Less Fuel Consumption by Civil Aircraft?	N/T	11/13	30	(0.8)
Arctic Ice Flow Measurements to Tip Off Where to Locate Oil Rigs, Pipelines	N/T	12/11	8	(0.8)
Steam To Power Taxi for the Handicapped	N/T	4/17	6	(0.7)
Solar-Energy Collector Teams With Heat Pump for Home Heating/Cooling	N/T	1/9	4	(1.5)
Wind Generator Makes a Comeback	Scan	3/20	37	(0.7)
Black-Chrome Coating Efficient Solar Collector	N/T	4/3	22	(0.7)
New Solar-Energy Absorber Holds Its Heat	N/T	4/3	24	(0.6)
Building Model Provides Answers On Solar-Energy Utilization	N/T	4/3	34	(0.5)
Little Energy Input Needed by Solar House	N/T	5/15	4	(0.7)
Geothermal Pump To Tap Deep, Hot Brine	N/T	5/29	12	(0.6)
Ocean-Energy Tappers Judged Feasible	N/T	6/12	18	(0.5)
Cost Answers Sought to Harnessing the Wind	N/T	6/26	8	(0.5)
Efficiency Doubled for Solar-Energy Collector	N/T	7/10	12	(0.7)
Reaping the Wind	Zimmerman	11/13	28	(2.0)
Satellite Solar-Power Stations	Aronson	11/27	18	(4.0)

32, 33, 34. Drives, Transmissions, Drive Components

Cam and Roller Drive Simplifies Orbital Transmission	Scan	2/20	48	(0.6)
How To Extend Gear Life	Haas	5/15	76	(4.0)
How To Test Gear Transmissions	Fessett	7/24	61	(4.0)
Hardware for Testing Gear Transmissions	Fessett	8/7	80	(4.0)
Straight Talk About Speed Reducers: Part 1—Gear Types and Mounting	MacFarland	9/18	90	(4.0)
Straight Talk About Speed Reducers: Part 2—Selection Factors	MacFarland	10/2	75	(5.0)
Mechanical Systems: Driveline Components	Chapter	MD 6/19	8	(5.0)
How To Extend Gear Life	Haas	5/15	76	(4.0)
How To Test Gear Transmissions	Fessett	7/24	61	(4.0)
Hardware for Testing Gear Transmissions	Fessett	8/7	80	(4.0)
Mechanical Systems: Driveline Components—Belt Drives	Chapter	MD 6/19	22	(1.0)
Pendulum Action Tests Navy's Cable	N/T	5/1	6	(0.5)
Mechanical Systems: Driveline Components—Chains	Chapter	MD 6/19	20	(2.0)
Cable Hooks Connect With a Twist	Scan	7/24	30	(0.5)
Lap Plus Shoulder Belts Equal Zero Auto Deaths	N/T	2/6	12	(0.5)
V-Belt Fibers—The Strongest Isn't Always The Best	Rohlfing, Morris & Reichardt	5/29	50	(4.0)
Mechanical Systems: Driveline Components—Industrial V-Belts	Chapter	MD 6/19	23	(3.0)
Getting More From Spur Gears	Hutten-Czapski	1/9	106	(5.0)
Dentistry in Engineering	DI	1/23	37	(0.5)
Taking Guesswork Out of Worm-Gear Design	Buckingham	3/20	82	(5.0)
Gear Concept Lets You Control Internal Sealing	Scan	5/1	26	(1.0)
How To Extend Gear Life	Haas	5/15	76	(4.0)
Mechanical Systems: Driveline Components—Gears and Gear Drives	Chapter	MD 6/19	13	(7.0)
How To Test Gear Transmissions	Fessett	7/24	61	(4.0)
Computing Efficiency for Bevel and Hypoid Gears	Coleman	8/21	64	(2.0)
Controlling Tooth Loads In Helical Gears	Buckingham	10/16	142	(4.0)
Adjustable Sheave Keeps Loads Rolling Smoothly	Scan	5/29	30	(0.7)
Web-Roll Center Distances	Rucinski	10/2	88	(1.0)
Floating Loop Skims Oil Off Water	Scan	11/27	34	(0.6)

35. Rotational Components

When Selecting a Bearing—Look Beyond Catalog Ratings	Liebensperger	4/3	142	(6.0)
Mechanical Systems: Bearings	Chapter	MD 6/19	152	(4.0)

Mechanical Systems: Bearings—Rolling-Element Bearings	Chapter	MD	6/19	169 (13.0)
Mechanical Systems: Bearings—Specialty Bearings	Chapter	MD	6/19	194 (10.0)
Estimating Life of Multibearing Systems	Gordon		8/21	74 (0.7)
Bearings Promised Lifetime Lubrication	N/T		9/18	6 (0.7)
New Motor Heralded as Major Advancement	N/T		10/16	6 (0.5)
PV Ratings For Plastic Bearings	Carswell		1/23	116 (1.4)
Design Dimensions for Plastic Bearings	Carswell		2/20	121 (1.3)
Injected Liner Improves Bearing Performance	Scan		5/15	30 (0.5)
Concentric Grooves Stabilize and Stiffen Bearing	Scan		6/12	42 (0.5)
Mechanical Systems: Bearings	Chapter	MD	6/19	152 (4.0)
Mechanical Systems: Bearings—Plain and Premounted Sleeve Bearings	Chapter	MD	6/19	156 (7.0)
Mechanical Systems: Bearings—Sliding-Bearing Materials	Chapter	MD	6/19	163 (6.0)
Predicting Wear in Plastic Bearings	Andersen		7/10	85 (3.0)
When To Grease Bearings	Booser		8/21	70 (4.0)
Stabilizing Babbitt Dimensions	Reichenecker		10/2	89 (1.0)
Plastic Socket Makes Ball Joint Easy to Assemble	Scan		12/11	48 (0.5)
Mechanical Systems: Driveline Components—Couplings	Chapter	MD	6/19	41 (3.0)
Mechanical Systems: Driveline Components—Universal Joints	Chapter	MD	6/19	46 (2.0)
Mechanical Systems: Driveline Components—Auxiliary Components	Chapter	MD	6/19	52 (1.0)
Getting The Most From Cantilever Shafts	Anderson		1/23	92 (4.0)
Shear Forces Strengthen High-Density PM Parts	Scan		11/27	36 (0.5)
Brake Material Survives Fire and Brimstone	Scan		1/9	38 (0.5)
Mechanical Systems: Driveline Components—Clutches and Brakes	Chapter	MD	6/19	27 (1.6)
Mechanical Systems: Driveline Components—Mechanical Brakes	Chapter	MD	6/19	37 (1.0)
Wavy Wires Provide Controlled Break-Away	Scan		9/18	42 (1.0)
Variable-Torque Brakes Take Up the Slack in Spooled Materials	Kaplan		11/13	136 (4.0)
Taking Guesswork Out of Disc Clutch Design	Morse & Hinkle		11/27	64 (2.0)
Balancing Parallel Blowers	Fader		2/6	86 (4.0)
Avoiding Dangerous and Costly Fan Failures	Hay & Martz		2/20	112 (7.0)
Flywheel in Auto To Replace Gasoline?	N/T		8/7	12 (0.5)

36, 37. Mechanisms, Controls

3-D Stampings	Strasser		11/13	143 (1.4)
Smoothing Out Cylinder Loads	Wood & Mirus		3/6	93 (1.4)
Optimizing the Four-Bar Linkage	Rao		4/17	106 (1.0)
Crank Smoothes Cylinder Loads	Chapter	FP	9/11	143 (0.8)
NC Positioning Without the Tape	Scan		4/17	40 (0.5)
Rope Ladder Inspires Linear Actuator Design	Scan		5/15	26 (1.0)
Actuator Shuts Itself Off When It Meets an Obstruction	Scan		6/12	41 (0.5)
Piezoelectric Positioner Imitates Earthworm	Scan		9/18	44 (0.7)
Wind-Up Power Sources—More Energy in a Smaller Package	Ferner		9/4	72 (5.0)
Jack-In-The-Box Light Unrolls Its Own Mast	Scan		3/6	36 (1.0)
Robot With a Soft Touch	DI		1/23	36 (0.5)
Trochoid Bearing Shakes As It Spins	Scan		2/6	44 (0.6)
Gravity Feed Tracks	Murch & Campbell		6/26	46 (4.0)
Coming—Robots That See and Feel	Article		7/10	90 (0.6)
Let The Robot Do It	Aronson		11/27	54 (6.0)
Measuring Platform Does a Lot of Legwork	Scan		10/16	55 (1.0)
Electromechanical Counters	Chapter	EM&C	4/24	158 (1.0)
Mechanical Counter Taps Machine for Power	Scan		9/4	33 (1.0)
Press Protector Detects Die Defects	Scan		8/7	28 (1.0)

40. Systems

Controls Are Getting Smarter	Cleveland		8/7	70 (4.0)

ASSEMBLY COMPONENTS

41, 42, 43. Fasteners, Springs & Isolation Devices, Misc.

Fasteners That Fight Fatigue	Khol		2/20	98 (5.0)
How Much Preload for Fasteners?	Dann		8/21	66 (4.0)
Keeping Fasteners Tight	Baston & Tokarski		9/18	86 (4.0)
The Move To Metric—1975: Standards O.K. Gives Industry the Go-Ahead	Chapter	FJ	11/20	2 (2.0)
Special-Purpose Fasteners: Self-Sealing Fasteners	Chapter	FJ	11/20	92 (1.0)
How Inserts Help Lightweight Structures	Viscio		6/12	113 (4.0)
Split-Ring Fastener Speeds Up Monkey Bar Assembly	Scan		10/16	59 (0.5)
Threaded Fasteners: Nuts and Inserts	Chapter	FJ	11/20	12 (5.8)
Non-Threaded Fasteners: Pins	Chapter	FJ	11/20	68 (1.5)
Special-Purpose Fasteners: Quick-Operating Fasteners	Chapter	FJ	11/20	94 (1.7)
Keyway Design Reduces Shaft Stress	Scan		4/17	37 (0.5)
Non-Threaded Fasteners: Retaining Rings	Chapter	FJ	11/20	70 (3.1)
Non-Threaded Fasteners: Rivets	Chapter	FJ	11/20	66 (2.5)
Tightening System Stops Broken Bolts	Scan		1/23	44 (0.6)
Bolt Preload—How Can You Be Sure It's Right?	Cornford		3/6	78 (5.0)
A Bolt That "Blows" Like A Fuse	Hutten-Czapski		5/29	46 (4.0)
Threaded Fasteners: Bolts, Screws, and Studs	Chapter	FJ	11/20	4 (5.6)
Non-Threaded Fasteners: Washers	Chapter	FJ	11/20	81 (1.0)
Hook-Up Block Takes the Hazards Out of Trawling	Scan		10/16	57 (0.7)
Special-Purpose Fasteners: Plastic Fasteners	Chapter	FJ	11/20	88 (2.6)
Special-Purpose Fasteners: Spring Clips	Chapter	FJ	11/20	90 (1.7)
Minimum Weight Springs	Agrawal		6/26	55 (0.7)
Designing Springs for Infinite Life	Kock		10/16	148 (2.0)
Minimum Volume Springs	Agrawal		11/13	147 (0.8)
Air-Cushion Restraints Called Unproven, Unpopular, and Too Expensive	N/T		6/26	10 (0.9)
Pneumatic Safety Bumper	DI		1/23	36 (0.5)
Buckled Spring Actuates Switch	Scan		7/24	28 (1.0)
Cylinder Lock Frustrates Burglars	Scan		8/21	32 (0.7)
New-Technology Credit Card Foils Counterfeiters	N/T		11/27	12 (0.5)
Two Tractor Cabs Beat Inside-Noise Record	N/T		2/6	4 (0.5)
Designing Lightweight Frames	Marshek & Rosenberg		5/15	88 (1.0)
Germany Bans Studded Snow Tires	Heumann		2/6	30 (3.0)
Forged Plastic Wheels May Replace Steel	N/T		7/24	6 (0.5)
Ring Equations for Evenly Spaced Loads	Lipp		9/4	77 (1.1)
Low-Cost Breakwater Formed with Old Tires	N/T		11/13	34 (0.5)
Elastomer in Wheels Silences Streetcars	N/T		11/27	4 (0.9)
Designing Lightweight Frames	Marshek & Rosenberg		5/15	88 (1.0)

49. General

Tightening System Stops Broken Bolts	Scan		1/23	44 (0.6)
Flexure Beams Weigh Off-Center Loads	Scan		4/3	46 (1.0)
Swinging Blade Tests Resilience of Pre-Stressed Materials	Scan		11/27	36 (0.5)
Digital Eyepiece Doesn't Need to Know Magnification Range	Scan		12/11	46 (0.6)

MATERIALS

51, 52. Ferrous, Nonferrous Metals

Materials 1975—Shortages and Uncertain Supply	Chapter	M	3/13	2 (1.0)
Materials 1975—Steels Fight Back With New Technology	Chapter	M	3/13	6 (2.0)
Ferrous Metals—How Atoms Are Arranged in Metals and Alloys	Chapter	M	3/13	9 (0.8)
GM Set for Materials Revolution	Wise		4/3	28 (4.0)

Mechanical Systems: Bearings—Sliding-Bearing Materials ..... Chapter MD 6/19 163 (6.0)
Threaded Fasteners: Materials ..... Chapter FJ 11/20 20 (2.3)
Ferrous Metals—Introduction to Ferrous Metallurgy ..... Chapter M 3/13 8 (1.2)
How To Save Money When Specifying Sheet Steel ..... Hand 7/10 70 (4.0)
Ferrous Metals: Cast Iron—Ductile, White, and Gray ..... Chapter M 3/13 10 (2.0)
Ferrous Metals: Cast Iron—Malleable... Chapter M 3/13 12 (0.8)
Ferrous Metals: Carbon Steel ..... Chapter M 3/13 12 (1.8)
Ferrous Metals: Alloy Steel ..... Chapter M 3/13 14 (2.0)
Ferrous Metals: Stainless Steel ..... Chapter M 3/13 18 (1.3)
Ferrous Metals: Tool Steel ..... Chapter M 3/13 19 (1.3)
Ferrous Metals: HSLA Steel ..... Chapter M 3/13 21 (1.8)
Carbon Steels Join the Superplastic Metals ..... Dreger 4/3 134 (4.0)
Ferrous Metals: Iron-Based Superalloys Chapter M 3/13 22 (1.0)
Nonferrous Metals—Introduction To Nonferrous Metallurgy ..... Chapter M 3/13 50 (3.0)
Nonferrous Metals: Aluminum ..... Chapter M 3/13 53 (2.1)
Nonferrous Metals: Temper Designations For Aluminum Alloys ..... Chapter M 3/13 55 (0.5)
Two Magnets 'Push' Aluminum Out of Garbage ..... N/T 10/2 10 (0.6)
Nonferrous Metals: Copper ..... Chapter M 3/13 56 (2.3)
Nonferrous Metals: Magnesium ..... Chapter M 3/13 59 (1.0)
Nonferrous Metals: Nickel ..... Chapter M 3/13 60 (2.0)
Iron Replaces Some Nickel in Decorative Plating ..... N/T 5/29 6 (0.7)
Nonferrous Metals: Titanium ..... Chapter M 3/13 64 (1.1)
Lower Cost Titanium Parts ..... Kulkarni 5/1 86 (3.0)
Superplastic Forming Wins Nod for Titanium Aircraft Structures ..... N/T 12/11 4 (0.7)
Nonferrous Metals: Zinc ..... Chapter M 3/13 67 (1.0)
Nonferrous Metals: Refractory Metals.. Chapter M 3/13 62 (0.7)
New Solar-Energy Absorber Holds Its Heat ..... N/T 4/3 24 (0.6)
Nonferrous Metals: Precious Metals .... Chapter M 3/13 62 (0.8)
Nonferrous Metals: Beryllium ..... Chapter M 3/13 55 (1.0)
Nonferrous Metals: Tin ..... Chapter M 3/13 63 (1.0)

53, 54. Plastics, Rubber & Elastomer

PV Ratings For Plastic Bearings ..... Carswell 1/23 116 (1.4)
Comparing High-Temperature Plastics.. Theberge, Arkles, & Cloud 2/6 73 (5.0)
Choosing Plastics for Chemical Resistance Theberge, Arkles, & Cloud 2/20 103 (5.0)
Plastics—Introduction to Polymer Chemistry ..... Chapter M 3/13 122 (3.0)
Plastics: Designing with Plastics ..... Chapter M 3/13 125 (1.0)
Plastics: High-Temperature Plastics .... Chapter M 3/13 158 (1.9)
How Time and Heat Affect Properties of Plastics ..... Theberge, Arkles & Cloud 3/20 79 (3.0)
Double-Tooth Extruder Mixes and Melts At the Same Time ..... Scan 4/3 51 (0.5)
Special-Purpose Fasteners: Plastic Fasteners ..... Chapter FJ 11/20 83 (2.6)
How Much Should You Trust ASTM Test Data? ..... Chastain 1/23 107 (5.0)
Design Dimensions for Plastic Bearings Carswell 2/20 121 (1.3)
Plastics: ABS ..... Chapter M 3/13 126 (1.1)
Plastics: Acetal ..... Chapter M 3/13 127 (1.3)
Plastics: Acrylic ..... Chapter M 3/13 128 (1.3)
Plastics: Cellulosics ..... Chapter M 3/13 132 (1.1)
Plastics: Fluoroplastics ..... Chapter M 3/13 135 (2.5)
Plastics: Nylon ..... Chapter M 3/13 137 (1.2)
Plastics: Phenylene Oxide ..... Chapter M 3/13 140 (0.8)
Plastics: Polycarbonate ..... Chapter M 3/13 141 (1.1)
Plastics: Polyimide ..... Chapter M 3/13 144 (1.1)
Plastics: Polyolefins ..... Chapter M 3/13 145 (2.9)
Plastics: Polyphenylene Sulfide ..... Chapter M 3/13 148 (0.6)
Plastics: Polysulfone ..... Chapter M 3/13 148 (0.7)
Plastics: Polystyrene ..... Chapter M 3/13 149 (0.7)
Plastics: Polyurethane ..... Chapter M 3/13 150 (1.0)
Plastics: Polyvinyl Chloride ..... Chapter M 3/13 151 (1.0)
Plastics: Reinforced Thermoplastics .... Chapter M 3/13 153 (1.7)
Elastomers: Thermoplastic Elastomers .. Chapter M 3/13 207 (1.1)
Now: Profile Extrusions From High-Performance Plastics ..... Dreger 5/29 42 (4.0)
Plastics: Alkyd ..... Chapter M 3/13 129 (0.8)
Plastics: Allylic ..... Chapter M 3/13 130 (0.8)
Plastics: Amino ..... Chapter M 3/13 131 (1.5)
Plastics: Epoxy ..... Chapter M 3/13 133 (1.2)
Plastics: Phenolic ..... Chapter M 3/13 139 (1.3)
Plastics: Polyester ..... Chapter M 3/13 142 (1.6)
Plastics: Polyimide ..... Chapter M 3/13 144 (1.1)
Plastics: Polyurethane ..... Chapter M 3/13 150 (1.0)
Plastics: Silicone ..... Chapter M 3/13 152 (1.0)
Plastics: Reinforced Thermosets ..... Chapter M 3/13 154 (1.1)
Elastomers: Thermoset Elastomers ..... Chapter M 3/13 204 (3.9)
Predicting Wear in Plastic Bearings .... Andersen 7/10 85 (3.0)
Materials First Claimed For Trident Missile ..... Article 10/2 16 (2.0)
Thick Plastic Parts in Less Than a Minute ..... Dreger 10/16 30 (3.0)
Plastics: Reinforced Thermoplastics .... Chapter M 3/13 153 (1.7)
Plastics: Reinforced Thermosets ..... Chapter M 3/13 154 (1.1)
Largest Fiberglass Ship Resulted from Tooling Idea ..... N/T 4/17 18 (0.5)
Elastomers That Conduct Electricity .... Comella 8/21 60 (4.0)
The Role of Fillers and Reinforcements in Plastics ..... Cloud 9/18 94 (4.0)
Materials 1975—Soft Bumpers, Friendly Fenders, and RIM ..... Chapter M 3/13 5 (1.0)
Elastomers: Thermoset Elastomers ..... Chapter M 3/13 204 (3.9)
Elastomers: Thermoplastic Elastomers.. Chapter M 3/13 207 (1.1)
Reaction-Injection Molding ..... Dreger 4/3 148 (4.0)
Seals that Survive Heat ..... Field 5/1 76 (4.0)
Elastomers That Conduct Electricity ... Comella 8/21 60 (4.0)
Coming: Implanted Artificial Muscles .. N/T 10/2 8 (0.7)
Elastomer in Wheels Silences Streetcars N/T 11/27 4 (0.9)

55, 56. Joining Materials, Other Nonmetals

Hot-Melt Adhesives Put It All Together Dreger 1/9 88 (7.0)
Only Ultraviolet Cures New Adhesive .. N/T 3/20 6 (0.6)
Mechanical Systems: Seals—Sealants .. Chapter MD 6/19 287 (2.0)
Joining Techniques: Adhesives ..... Chapter FJ 11/20 122 (1.8)
Finally! A Brazing Alloy for PM Parts Scan 4/17 37 (0.5)
Other Engineering Materials—Carbon .. Chapter M3/13 220 (1.0)
Materials First Claimed For Trident Missile ..... Article 10/2 16 (2.0)
Other Engineering Materials—Ceramics.. Chapter M 3/13 221 (1.6)
Other Engineering Materials—Glass .... Chapter M 3/13 223 (1.2)
Largest Fused-Silica Windows Going into Space Shuttle ..... N/T 4/17 4 (0.7)
Injection Molding Moves Into Metals ... Dreger 10/2 80 (2.0)
Piezoelectric Ceramics Show Promise as Prosthetic Bones ..... N/T 11/13 8 (0.7)
Ceramic Holding Magnets ..... Place 11/13 119 (3.0)
Other Engineering Materials—Fibers ... Chapter M 3/13 222 (0.7)
V-Belt Fibers—The Strongest Isn't Always The Best ..... Rohlfing, Morris & Reichardt 5/29 50 (4.0)
Elastomers That Conduct Electricity ... Comella 8/21 60 (4.0)
The Role of Fillers and Reinforcements in Plastics ..... Cloud 9/18 94 (4.0)
Two Tractor Cabs Beat Inside-Noise Record ..... N/T 2/6 4 (0.5)
Insulation Installers Readied for Trans-Alaskan Pipeline ..... N/T 4/3 8 (0.7)
New Motor Heralded as Major Advancement ..... N/T 10/16 6 (0.5)
Improved Regenerators Ready for Testing in Auto Turbines ..... N/T 2/6 10 (0.7)
How Parts React to Stress ..... Blodgett 3/6 87 (5.0)
Brake Material Survives Fire and Brimstone ..... Scan 1/9 38 (0.5)

57. Finishes, Coatings, Lubricants

Mercury Coating Makes Hard Materials Easy To Cut ..... Scan 9/18 48 (0.5)
One Paint Covers Almost Anything .... N/T 3/6 6 (0.7)
Powder Coatings That Fight Heat and Chemicals ..... Arkles & Gerakaris 6/12 103 (5.0)
New Gel Coat Proves Better for Boats.. N/T 10/16 8 (0.5)
Controlling Aerosols With Oil-less Cylinders ..... Boulden 1/9 95 (5.0)
Synthesized Motor Oil Faces Tough Police-Car Testing ..... N/T 2/20 8 (0.7)
Oil Analysis Reveals NC Design Tips ... N/T 2/20 32 (1.0)
Supergrease Replaces Oil as a Transmission Lubricant ..... Christian 6/12 117 (3.0)
Mechanical Systems: Bearings—Lubricants ..... Chapter MD 6/19 211 (3.0)
When To Grease Bearings ..... Booser 8/21 70 (4.0)
Courtesy Cars Testing Fuels and Oil .... N/T 10/16 8 (0.5)

58. Prefabricated Forms

How To Save Money When Specifying Sheet Steel ..... Hand 7/10 70 (4.0)
Materials First Claimed For Trident Missile ..... Article 10/2 16 (2.0)
Largest Fused-Silica Windows Going into Space Shuttle ..... N/T 4/17 4 (0.7)
Tough New Composites: Plastics Faced With Glass Microsheet ..... N/T 6/12 10 (0.5)
Plastics: Structural Foam ..... Chapter M 3/13 157 (0.7)
Reaction-Injection Molding ..... Dreger 4/3 148 (4.0)

59. General

Oil Shale and Tar Sands Very Much In Energy Ballgame ..... N/T 2/6 26 (0.8)
Materials 1975—Some Metal Alloys Can Be Structured Without Rhyme or Reason ..... Chapter M 3/13 4 (0.5)

MANUFACTURING PROCESSES

61, 62, 63. Metals Casting, Shaping, Forming

Castings Without Defects—Part 1	Kearney	6/26	42	(4.0)
Castings Without Defects—Part 2	Kearney	7/10	82	(3.0)
Cutting Costs of Few-of-a-Kind Castings	Dreger	11/13	140	(3.0)
Casting Technique Promises New Economies	N/T	6/12	12	(0.5)
Die Casting Stand-Ins	Bennett	7/24	46	(4.0)
Lower Cost Titanium Parts	Kulkarni	5/1	86	(3.0)
Designing Cold-Headed Fasteners	Zanin	7/10	89	(1.3)
Shear Forces Strengthen High-Density PM Parts	Scan	11/27	36	(0.5)
Finally! A Brazing Alloy for PM Parts	Scan	4/17	37	(0.5)
Multi-Part PM: When Two Parts Are Better Than One	Altemeyer	5/15	80	(3.0)
Injection Molding Moves Into Metals	Dreger	10/2	80	(2.0)
Low-Cost Forming	Strasser	6/26	57	(1.0)
Low-Cost Stampings	Strasser	2/6	91	(1.4)
Keeping Tool Costs Low for Stampings	Strasser	4/17	105	(1.0)
Superplastic Forming Wins Nod for Titanium Aircraft Structures	N/T	12/11	4	(0.7)

64, 65. Metal Joining, Removal

Design of Welded Brackets	Blake	1/23	96	(5.0)
Refresher Course in Welding Design	Blodgett	4/3	177	(1.5)
Hardsurfacing With an Arc	Hinkel	8/21	74	(1.3)
Joining Techniques: Welding Processes	Chapter FJ	11/20	110	(2.2)
Keeping Weldment Distortion Under Control	Blodgett	10/16	146	(2.0)
Threaded Fasteners: Welded Fasteners	Chapter FJ	11/20	24	(2.3)
No-Melt Welding	Aronson	10/16	128	(6.0)
Joining Techniques: Brazing Processes	Chapter FJ	11/20	112	(2.1)
The Final Connection: Sockets or Solder?	Gove	6/26	39	(3.0)
Joining Techniques: Soldering Processes	Chapter FJ	11/20	119	(2.0)
Overstressed Materials Cry Out in Pain	Scan	7/10	36	(1.0)
Bolt Preload—How Can You Be Sure It's Right?	Cornford	3/6	78	(5.0)
Designing Parts That Are Easy To Machine	Strasser	8/7	65	(5.0)
Mercury Coating Makes Hard Materials Easy To Cut	Scan	9/18	48	(0.5)
Hydraulic Band Saw Solves Cutting Problem	N/T	8/7	6	(0.6)

66. Metal Treating

Ferrous Metals: Guide to Common Heat-Treating Processes	Chapter M	3/13	15	(0.6)
Shot Blasting Your Way to Better Finishes	Hanley	3/20	74	(5.0)

67, 68. Finishing, Plastics & Rubber Processes

Iron Replaces Some Nickel in Decorative Plating	N/T	5/29	6	(0.7)
Plating With a Brush	White	10/2	72	(3.0)
Hardsurfacing With an Arc	Hinkel	8/21	74	(1.3)
30,000 Plastic Parts Molded Accurately Each Hour	N/T	1/9	6	(0.5)
Materials 1975—Soft Bumpers, Friendly Fenders, and RIM	Chapter M	3/13	5	(1.0)
Reaction-Injection Molding	Dreger	4/3	148	(4.0)
Forged Plastic Wheels May Replace Steel	N/T	7/24	6	(0.5)
Plastic Parts By The Mile	Dreger	9/4	64	(2.0)
Injection Molding Moves Into Metals	Dreger	10/2	80	(2.0)
Thick Plastic Parts in Less Than a Minute	Dreger	10/16	30	(3.0)
Double-Tooth Extruder Mixes and Melts At the Same Time	Scan	4/3	51	(0.5)
Now: Profile Extrusions From High-Performance Plastics	Dreger	5/29	42	(4.0)
Plastics: Laminated Plastics	Chapter M	3/13	155	(1.4)
Joining Techniques: Plastic Joining	Chapter FJ	11/20	128	(2.0)

69. General

Electronic Assembly: In-House or Subcontract?	Leonard	11/13	122	(6.0)
Threaded Fasteners: Automatic Assembly	Chapter FJ	11/20	32	(2.0)
Robot With a Soft Touch	DI	1/23	36	(0.5)

DESIGN THEORY & TECHNIQUES

71, 72, 73. Mechanics, Strengths of Materials and Parts

Shipment Could Be A Product's Most Severe Test	Voss & Young	1/9	111	(1.5)
A Simple Way To Use Vibration Equations	Harker	2/6	78	(4.0)
Avoiding Dangerous and Costly Fan Failures	Hay & Martz	2/20	112	(7.0)
Isolating Engine Vibration	Wright	4/17	87	(5.0)
Analyzing Do-It-Yourself Servosystems	Maskrey	4/17	92	(6.0)
Simpler Tuning for Wien-Bridge Oscillators	Brokaw	9/4	78	(0.8)
Dynamic Tester Hammers Out Structural Defects	Scan	1/9	38	(0.5)
Shipment Could Be A Product's Most Severe Test	Voss & Young	1/9	111	(1.5)
Controlling Nature's 'Faults'	Zimmerman	1/23	20	(8.0)
Combining Decibels	Caplan	1/23	118	(1.0)
Machines You Can Talk To	Glenn	5/1	72	(4.0)
Overstressed Materials Cry Out in Pain	Scan	7/10	36	(1.0)
Inlet Redesign Will Help Silence Big Jets	N/T	10/16	10	(0.6)
Finding — and Fixing — Hydraulic Noise Sources	Stecki & Dransfield	11/13	146	(1.2)
Pressure Distorts Cylinders Where You Least Expect It	Blake	2/6	90	(1.4)
Overstressed Materials Cry Out in Pain	Scan	7/10	36	(1.0)
Stress Concentrations in Notched Rings	Tabakman	11/27	72	(1.4)
How Much Should You Trust ASTM Test Data?	Chastain	1/23	107	(5.0)
The Penalty For Breaking Hooke's Law	Polma	1/23	112	(4.0)
Ferrous Metals: Steels for Strength	Chapter M	3/13	20	(0.5)
Fasteners That Fight Fatigue	Khol	2/20	98	(5.0)
Avoiding Dangerous and Costly Fan Failures	Hay & Martz	2/20	112	(7.0)
A Fatigue Plot That Shows Strength Tradeoffs	Shawki	2/20	120	(1.7)
Pendulum Action Tests Navy's Cable	N/T	5/1	6	(0.5)
A Bolt That "Blows" Like A Fuse	Hutten-Czapski	5/29	46	(4.0)
Estimating Life of Multibearing Systems	Gordon	8/21	74	(0.7)
Swinging Blade Tests Resilience of Pre-Stressed Materials	Scan	11/27	36	(0.5)
Radioactive Line Keeps an Eye on Machinery Wear	Scan	1/23	48	(0.5)
Predicting Wear in Plastic Bearings	Andersen	7/10	85	(3.0)
PPS Pistons Show No Visible Wear After Two Years in a Compressor	N/T	9/4	18	(0.5)
A Bolt That "Blows" Like A Fuse	Hutten-Czapski	5/29	46	(4.0)
Getting The Most From Cantilever Shafts	Anderson	1/23	92	(4.0)
The Penalty For Breaking Hooke's Law	Polma	1/23	112	(4.0)
Bolt Preload—How Can You Be Sure It's Right?	Cornford	3/6	78	(5.0)
How Parts React to Stress	Blodgett	3/7	87	(5.0)
Ring Equations for Evenly Spaced Loads	Lipp	9/4	77	(1.1)
Coping With Stress Concentration	Blake	11/13	128	(4.0)
Simple Guide to TP Dimensioning	Spotts	11/13	132	(4.0)
Design of Welded Brackets	Blake	1/23	96	(5.0)
Choosing Plastics for Chemical Resistance	Theberge, Arkles, & Cloud	2/20	103	(5.0)
How Time and Heat Affect Properties of Plastics	Theberge, Arkles & Cloud	3/20	79	(3.0)
Finding Shear Center	Ganapathy	7/24	66	(0.8)
Adapting Beam Equations to Plates	Seshardi	9/18	106	(1.3)
How Much Preload for Fasteners?	Dann	8/21	66	(4.0)
A Simple Way To Visualize Torsional Stress	Agrawal	9/18	98	(4.0)
Pressure Distorts Cylinders Where You Least Expect It	Blake	2/6	90	(1.4)
Smoothing Out Cylinder Loads	Wood & Mirus	3/6	93	(1.4)
Scanner Suspension Fights Tilt	Scan	5/1	27	(0.5)
Stresses In Thick-Wall Cylinders	Zanker	10/16	150	(1.0)
Critical Buckling Loads for Tapered Columns	Baumeister & Sebrosky	11/27	70	(1.5)

A New Way to Analyze Rotor Stability	Maslo & Rieger	10/2	69	(3.0)

74. Human-Factors Engineering

Machines You Can Talk To	Glenn	5/1	72	(4.0)
Emergency Rescue Equipment	Aronson	6/12	28	(3.0)
Help Plan Life-Sciences Program for the '80s	N/T	7/10	28	(0.5)
Lap Plus Shoulder Belts Equal Zero Auto Deaths	N/T	2/6	12	(0.5)
Controlling Aerosols With Oil-less Cylinders	Boulden	1/9	95	(5.0)
The Clampdown on Electrical Hazards	Leonard	1/9	100	(6.0)
Controlling Nature's 'Faults'	Zimmerman	1/23	20	(8.0)
What You Should Know About Product Recall	Bryson	1/23	88	(4.0)
Design for Disaster: High-Rise Fires—Preventing a "Towering Inferno"	Aronson	3/20	18	(7.0)
Safety Radar Promising for Vehicles	N/T	4/3	12	(0.6)
New Head Adds Realism to Crash Dummy	N/T	5/1	4	(0.6)
Air-Cushion Restraints Called Unproven, Unpopular, and Too Expensive	N/T	6/26	10	(0.9)
Step Taken Toward Research Safety Vehicle	N/T	7/10	4	(0.8)
Car-Impact Study Promises New Hope for Pedestrians	N/T	8/21	8	(1.0)
Firefighters to Start Wearing Aerospace-Technology Breathing System	N/T	11/13	32	(0.8)
Three Lasers in a Cane Provide Eyes for the Blind	N/T	3/20	10	(1.3)
Measuring Platform Does a Lot of Legwork	Scan	10/16	55	(1.0)
Coming: Implanted Artificial Muscles	N/T	10/2	8	(0.7)
Piezoelectric Ceramics Show Promise as Prosthetic Bones	N/T	11/13	8	(0.7)

75. Design Analysis & Synthesis

Power Bond Graphs—Powerful New Tool For Hydraulic System Design	Dransfield	10/16	134	(5.0)
Superaccelerators: Servomotors with Instant Reflexes	Sohlberg	1/23	101	(6.0)
A Simple Way To Use Vibration Equations	Harker	2/6	78	(4.0)
Eight Easy Ways to Use Statistics—Part 1	Spotts	2/20	108	(5.0)
Eight Easy Ways to Use Statistics—Part 2	Spotts	3/6	83	(4.0)
Tracking Down Elusive Causes for Failure	Lipinski	4/3	130	(4.0)
Angle Approximations Save Design Time	McKnight	4/3	179	(0.8)
Probabilistic Design—Part 1	Haugen & Wirsching	4/17	98	(7.0)
Probabilistic Design—Part 2	Haugen & Wirsching	5/1	80	(6.0)
Calc Program Simplifies Simultaneous Equations	Rubin	5/1	89	(0.7)
Probabilistic Design—Part 3	Haugen & Wirsching	5/15	83	(5.0)
Probabilistic Design—Part 4	Haugen & Wirsching	5/29	54	(5.0)
Probabilistic Design—Part 5	Haugen & Wirsching	6/12	108	(5.0)
Pushbutton Trig	Byers	6/12	123	(0.5)
Calculating New Positions For Rotated Axes	Felstein	6/26	55	(1.3)
Statistics From Raw Data	Spotts	7/24	58	(3.0)
Calc Program finds nth Root	Simmons	9/18	107	(0.7)
Geometric Properties of Axisymmetric Shapes	Paulsen	11/13	144	(1.6)
Smoothing Out Cylinder Loads	Wood & Mirus	3/6	93	(1.4)
Pattern Recognition Techniques Provide Powerful Quality-Control Tools	N/T	9/4	6	(0.6)
Geometric Properties of Axisymmetric Shapes	Paulsen	11/13	144	(1.6)
How Parts React to Stress	Blodgett	3/7	87	(5.0)
New Head Adds Realism to Crash Dummy	N/T	5/1	4	(0.6)
Digital Simulation	Appel	7/10	74	(4.0)
Test Pit Provides Real Construction-Machine Data	N/T	9/4	24	(1.0)
A New Way to Analyze Rotor Stability	Maslow & Rieger	10/2	69	(3.0)
Transaction Telephone: One Step Closer to the No-Cash, No-Cheat Society	N/T	1/23	10	(0.6)
Machines You Can Talk To	Glenn	5/1	72	(4.0)
Is CAD-CAM Taking Off?	Zimmerman	6/12	20	(4.0)
Chrysler's 'Electronic' Lean-Burn Engine	N/T	7/10	24	(3.0)
Pattern Recognition Techniques Provide Powerful Quality-Control Tools	N/T	9/4	6	(0.6)
What You Should Know About Product Recall	Bryson	1/23	88	(4.0)
Probabilistic Design—Part 1	Haugen & Wirsching	4/17	98	(7.0)
Probabilistic Design—Part 2	Haugen & Wirsching	5/1	80	(6.0)
Probabilistic Design—Part 3	Haugen & Wirsching	5/15	83	(5.0)
Probabilistic Design—Part 4	Haugen & Wirsching	5/29	54	(5.0)
Probabilistic Design—Part 5	Haugen & Wirsching	6/12	108	(5.0)
Pattern Recognition Techniques Provide Powerful Quality-Control Tools	N/T	9/4	6	(0.6)
What Determines Reliability in Metering Pumps?	Holloway	9/4	66	(3.0)
Adapting Holography to the Industrial Environment	Article	2/6	92	(1.1)
Photogrammetry: Getting A Bead On Hard-To-Measure Objects	Higgins	7/24	50	(4.0)
Visual Standards: Shortcut to Product Quality	Leek	9/4	69	(3.0)
Scissors-Wing Aircraft Nears Design Stage	N/T	1/23	4	(0.8)
Living Costs Devour Salary Gains	Zimmerman	2/20	20	(4.0)

76. Basic Sciences & Fields

Gaskets That Block EMI	Severinsen	7/7	74	(4.0)
Serendipity Revisted: Lead - Poisoning Test Falls Out from Wire-Insulation Studies	N/T	2/20	12	(0.7)
Three Lasers in a Cane Provide Eyes for the Blind	N/T	3/20	10	(1.3)
New Head Adds Realism to Crash Dummy	N/T	5/1	4	(0.6)
Help Plan Life-Sciences Program for the '80s	N/T	7/10	28	(0.5)
Coming: Implanted Artificial Muscles	N/T	10/2	8	(0.7)
Blanket Soaks Up Oil Spills; Microbe Converts Them Into Fish Food	N/T	10/16	4	(1.0)
Technology Fights Famine: Power To Produce Plenty	Zimmerman	10/16	18	(6.0)
Measuring Platform Does a Lot of Legwork	Scan	10/16	55	(1.0)
Piezoelectric Ceramics Show Promise as Prosthetic Bones	N/T	11/13	8	(0.7)
Garbage Power	Bryson	1/9	20	(6.0)
Milwaukee To Reclaim Its Solid Waste	N/T	2/20	18	(1.0)
MIUS: Darkhorse in the Nation's Energy Future?	Zimmerman	4/17	20	(5.0)
Minimizing Oil-Spill Hazards	Zimmerman	5/1	16	(5.0)
Two Magnets 'Push' Aluminum Out of Garbage	N/T	10/2	10	(0.6)
Blanket Soaks Up Oil Spills; Microbe Converts Them Into Fish Food	N/T	10/16	4	(1.0)
Low-Cost Breakwater Formed with Old Tires	N/T	11/13	34	(0.5)
Breaking the Ice Barrier	Bryson	2/6	20	(5.0)
Comparing High-Temperature Plastics	Theberge, Arkles, & Cloud	2/6	73	(5.0)
Choosing Plastics for Chemical Resistance	Theberge, Arkles, & Cloud	2/20	103	(5.0)
Plastics: High-Temperature Plastics	Chapter	M 3/13	158	(1.9)
How Time and Heat Affect Properties of Plastics	Theberge, Arkles, & Cloud	3/20	79	(3.0)
How Seals Act At High Temperatures	Chapter	FP 9/11	189	(1.0)

78. Environmental Design

Apollo-Soyuz: Timely Union for Co-op Technology	Zimmerman	7/10	16	(4.0)
Mars-Viking: Tougher Than Apollo?	Article	8/7	8	(3.0)
Putting Data from Mars on 'HOLD'	Zimmerman	11/13	36	(3.0)
TFB: A Better Breakwater Put to the Test	N/T	7/10	10	(0.7)
Fuel Cells to Speed Rescue of Trapped Submariners	N/T	7/24	10	(0.8)
Present Technology Meets '77 Auto-Emissions Standards	N/T	2/6	8	(0.7)
'New' Pollutant Forces EPA To Revise Auto-Emission Standards	N/T	4/3	4	(0.8)
Minimizing Oil-Spill Hazards	Zimmerman	5/1	16	(5.0)
NRC Has Its Say on Auto Emissions and Air Pollution	N/T	7/24	12	(0.7)
Design Dimensions for Plastic Bearings	Carswell	2/20	121	(1.3)
Avoiding Interference in Round Parts	D'Entremont	7/10	88	(1.0)
Tolerancing Determines How Round Parts Take Shape	Spotts	10/16	139	(3.0)
Simple Guide to TP Dimensioning-1	Spotts	11/27	66	(4.0)
3-Year Report on 'No-Fault, No-Questions-Asked' Guarantee	N/T	4/3	34	(0.5)
Pareto's Law for Managers	Bronikowski	7/24	65	(1.0)

ENGINEERING MANAGEMENT & OPERATION

81. Engineering Department Operations

Engineering Productivity: Formulating a Plan of Attack	Comella	12/11	118	(2.0)
Six Current Issues in Engineering Manpower	Zimmerman	6/26	18	(5.0)
Motivating Engineers: A Little Psychology Goes A Long Way	Badawy	10/16	120	(3.0)
Running the Department	Samaras	12/11	139	(4.0)
When Two Bosses Are Better Than One	Grinnell & Apple	1/6	84	(4.0)
Providing Technical Support	Price	12/11	134	(5.0)
The 1-3-9 Rule for Product Cost Estimation	Rondeau	8/21	50	(4.0)
Keeping Project Costs in Line	Davis	12/11	128	(6.0)
Transactional Analysis—A New Way To Prevent People Problems	Jackson	11/27	50	(4.0)
Training Tomorrow's Engineers	Zimmerman	5/1	68	(4.0)
Providing Technical Support	Price	12/11	134	(5.0)
Alternative to the MBA	Babcock	2/20	88	(4.0)
How To Manage Creativity Without Killing It	Comella	3/6	68	(5.0)
Easing The Switch From Engineer to Manager	Badawy	5/15	66	(3.0)
Teamwork: Silent Partner In The Design Group	Raudsepp	8/7	62	(3.0)
Transactional Analysis—A New Way To Prevent People Problems	Jackson	11/27	50	(4.0)
Living Costs Devour Salary Gains	Zimmerman	2/20	20	(4.0)
How Near 'Average' Is Your Salary?	Zimmerman	3/6	20	(2.0)
Communicating Is More Than Just Talking	Raudsepp	11/13	116	(3.0)
Transactional Analysis—A New Way To Prevent People Problems	Jackson	11/27	50	(4.0)

82, 83. New Product Development, Drafting & Reproduction

U. S. To Spend $35.6 Billion for R&D in '75	N/T	1/23	18	(0.5)
Reducing the Risks in New-Product Planning	LaPasso	7/24	42	(4.0)
Motivating Engineers: A Little Psychology Goes A Long Way	Badawy	10/16	120	(3.0)
Getting a Handle on Productivity	McDonald	12/11	120	(5.0)
New Tools For Old Tasks: Reproduction Equipment	Streit	12/11	149	(3.0)

84. Laboratory & Testing

Dynamic Tester Hammers Out Structural Defects	Scan	1/9	38	(0.5)
How Much Should You Trust ASTM Test Data?	Chastain	1/23	107	(5.0)
Improved Regenerators Ready for Testing in Auto Turbines	N/T	2/6	10	(0.7)
Adapting Holography to the Industrial Environment	Article	2/6	92	(1.1)
Synthesized Motor Oil Faces Tough Police-Car Testing	N/T	2/20	8	(0.7)
Serendipity Revisited: Lead - Poisoning Test Falls Out from Wire-Insulation Studies	N/T	2/20	12	(0.7)
Oil Analysis Reveals NC Design Tips	N/T	2/20	32	(1.0)
How Time and Heat Affect Properties of Plastics	Theberge, Arkles, & Cloud	3/20	79	(3.0)
Taking Guesswork Out of Worm-Gear Design	Buckingham	3/20	82	(5.0)
Tracking Down Elusive Causes for Failure	Lipinski	4/3	130	(4.0)
Math Model Predicts Characteristics of Head-On Car Crashes	N/T	4/17	8	(0.6)
Isolating Engine Vibration	Wright	4/17	87	(5.0)
Analyzing Do-It-Yourself Servosystems	Maskrey	4/17	92	(6.0)
Pendulum Action Tests Navy's Cable	N/T	5/1	6	(0.5)
Step Taken Toward Research Safety Vehicle	N/T	7/10	4	(0.8)
How To Test Gear Transmissions	Fessett	7/24	61	(4.0)
Hardware for Testing Gear Transmissions	Fessett	8/7	80	(4.0)
Car-Impact Study Promises New Hope for Pedestrians	N/T	8/21	8	(1.0)
Test Pit Provides Real Construction-Machine Data	N/T	9/4	24	(1.0)
Courtesy Cars Testing Fuels and Oil	N/T	10/16	8	(0.5)
Inlet Redesign Will Help Silence Big Jets	N/T	10/16	10	(0.6)
Electronic Assembly: In-House or Subcontract?	Leonard	11/13	122	(6.0)
Swinging Blade Tests Resilience of Pre-Stressed Materials	Scan	11/27	36	(0.5)
Stress Concentrations in Notched Rings	Tabakman	11/27	72	(1.4)
Two Frequencies Minimize Errors in Eddy-Current Tester	Scan	12/11	44	(1.0)

85. Technical Information

Write A Better Instruction Manual	Article	1/23	117	(0.6)
Product Publications: Wrapping Up The Paperwork	Pohs	6/26	36	(3.0)
Half-Scale Car Presented Driver-Packaging Problem	N/T	3/6	4	(1.0)
How Much Should You Trust ASTM Test Data?	Chastain	1/23	107	(5.0)
Present Technology Meets '77 Auto-Emissions Standards	N/T	2/6	8	(0.7)
Design for Disaster: High-Rise Fires—Preventing a "Towering Inferno"	Aronson	3/20	18	(7.0)
NEMA Control Relays	Chapter EM&C	4/24	136	(1.4)
Metrication Will Arrive in '75	Wise	7/10	66	(4.0)
Visual Standards: Shortcut to Product Quality	Leek	9/4	69	(3.0)
The Move To Metric—1975: Standards O.K. Gives Industry the Go-Ahead	Chapter FJ	11/20	2	(2.0)
Visual Standards: Shortcut to Product Quality	Leek	9/4	69	(3.0)

86, 87. Patents & Patent Law, Personal & Professional

Motivating Engineers: A Little Psychology Goes A Long Way	Badawy	10/16	120	(3.0)
Maximizing Engineering Effectiveness	Miller	12/11	125	(3.0)
How To Manage Creativity Without Killing It	Comella	3/6	68	(5.0)
The Road to Registration—1: The Basic Requirements	Constance	9/4	54	(6.0)
The Road to Registration—2: Passing the Exam	Constance	9/18	82	(4.0)
Alternative to the MBA	Babcock	2/20	88	(4.0)
Helping The Engineer Plan His Career	Brynildsen	3/20	66	(4.0)
Turn On the Boob-Tube; Learn About Microprocessors	N/T	4/3	6	(0.6)
Here Come the Technologists!	Lavoie	4/17	76	(5.0)
Training Tomorrow's Engineers	Zimmerman	5/1	68	(4.0)
Your Day In Court	Talbot	2/6	68	(5.0)
What To Do Before The Subpoena Comes	Wallace	6/12	100	(3.0)
Product Liability: After the Summons	Wallace	10/2	66	(3.0)

88. Outside Services

The President and Technology	Article	4/3	18	(4.0)

COMPLETE MACHINES

911. Ordnance

Fully Stabilized Gun Turret	DI	1/9	30	(0.5)
Another Try For a New Tank	Ogorkiewicz	5/29	20	(3.0)
New Armored Vehicle to Quel Irish Brawls	N/T	9/4	10	(1.0)
'Friendly Enemy' To Receive Tailored Probes	N/T	10/16	12	(0.6)
Nuclear War Not Likely To Wipe Out Life	N/T	11/27	12	(0.5)

912. Machinery

Breaking the Ice Barrier	Bryson	2/6	20	(5.0)
Gravity Feed Tracks	Murch & Campbell	6/26	46	(4.0)
Field - Going Factories: Agriculture's Amazing Monster Machines	Zimmerman	8/21	16	(6.0)
Test Pit Provides Real Construction-Machine Data	N/T	9/4	24	(1.0)

Technology Fights Famine: Working With Groceries in Nature	Zimmerman	9/18	34	(6.0)
Technology Fights Famine: Power To Produce Plenty	Zimmerman	10/16	18	(6.0)

913. Electrical Machinery

The Clampdown on Electrical Hazards	Leonard	1/9	100	(6.0)
Turn On the Boob-Tube; Learn About Microprocessors	N/T	4/3	6	(0.6)
Safety Radar Promising for Vehicles	N/T	4/3	12	(0.6)
Satellite Solar-Power Stations	Aronson	11/27	18	(4.0)

914. Transportation

Scissors-Wing Aircraft Nears Design Stage	N/T	1/23	4	(0.8)
Two New '75s Offer Overdrive	N/T	1/23	6	(0.7)
Lap Plus Shoulder Belts Equal Zero Auto Deaths	N/T	2/6	12	(0.5)
Half-Scale Car Presented Driver-Packaging Problem	N/T	3/6	4	(1.0)
Two New Compacts Join the VW Family	Aronson	3/6	25	(3.0)
GM Set for Materials Revolution	Wise	4/3	28	(4.0)
Steam To Power Taxi for the Handicapped	N/T	4/17	6	(0.7)
Cadillac's Small Car	Wise	4/17	10	(2.0)
Largest Fiberglass Ship Resulted from Tooling Idea	N/T	4/17	18	(0.5)
Looking for an 'Edge' at Indy	Wise	5/15	16	(5.0)
Realistic Range Achieved by Electric Vehicle	N/T	6/26	4	(1.0)
Cosworth Vega Performs Like a Corvette	N/T	6/26	6	(0.5)
Air-Cushion Restraints Called Unproven, Unpopular, and Too Expensive	N/T	6/26	10	(0.9)
From Europe's Automakers: New Hatchbacks and New Ideas	DI	6/26	26	(2.0)
Step Taken Toward Research Safety Vehicle	N/T	7/10	4	(0.8)
Apollo-Soyuz: Timely Union for Co-op Technology	Zimmerman	7/10	16	(4.0)
Mars-Viking: Tougher Than Apollo?	Article	8/7	8	(3.0)
New Truck Burns Much Less Fuel	N/T	8/7	12	(0.5)
F-16: First With Fly-By-Wire	Wise	8/7	16	(5.0)
'Luxury' Electric Car In Production	N/T	8/21	4	(1.0)
Car-Impact Study Promises New Hope for Pedestrians	N/T	8/21	8	(1.0)
Diesel Option Offered For Light American Vehicles	N/T	9/4	4	(0.7)
Germany's Electric Scooters	Heumann	9/4	20	(1.5)
Clamp-On Sail Replaces Oars	N/T	9/4	22	(0.5)
1976 New-Model Preview: Cars Are Young and Fun Again	Wise	9/18	18	(8.0)
What's Happening With Electric Vehicles	Aronson	10/2	20	(3.0)
Chrysler Drops Imperial, Adds Two New Compacts	Wise	10/16	38	(5.0)
Hydride Storage Key to Hydrogen-Powered Vehicles	N/T	11/13	4	(1.0)
The Airship—Phoenix or Dodo?	Regan	11/13	20	(4.0)
New Design/Redesign, 1975	Wise	12/11	20	(9.0)

915. Instruments

Hardware for Testing Gear Transmissions	Fessett	8/7	80	(4.0)

916. Fabricated Metal Products

Common Energy Pack/Recharger Designed for Cordless Tools	N/T	5/1	8	(0.5)

917. Leisure and Hobby

Downhill By Design	Wise	2/20	26	(3.0)
Balloon-Lifted Manned Sphere To Cross Atlantic	N/T	1/9	12	(0.7)

The classification system provides nine major (one-digit) classifications, each of which has up to nine (two-digit) sub-classifications. These, in turn, are divided into ten (three-digit) indexing classifications.

Indexing classifications ending in 0 (General) are used to index material concerning several or all indexing classifications ending in 1 through 8. Classifications ending in 9 (Other) are used for material falling within the sub-classification but not within any of the items 1 through 8.

1—ELECTRICAL AND ELECTRONIC

11 Motors
110 General
111 Fractional (less than 1 hp)
112 Ac integral horsepower, induction
113 Dc integral horsepower
114 Universal (dc or ac)
115 Multispeed
116 Gearmotor
117 Torque
118 Definite and special purpose, pancake
119 Other: Linear, motor protectors

12 Power Supplies
120 General
121 Batteries, battery chargers, battery holders
122 Dc generators, motor-generators
123 Ac generators, motor-generators, alternators
124 Converters, inverters
125 Transformers, voltage regulators
126 Fuel cells, solar cells, photo cells
127 Thermoelectric supplies
128 Antennas
129 Other

13 Switches and Relays
130 General
131 Mechanical: Pushbutton, toggle, rotary, acceleration
132 Thermally operated: Thermostats, thermistors
133 Pressure operated
134 Limit, snap-action
135 Proximity, photoelectric, magnetic, Hall effect
136 Stepping
137 Relays, circuit breakers
138 Motor starters, motor controls, contactors, starting reactors
139 Other: Reed, mercury-wetted

14 Instruments and Controls
140 General
141 Sensing devices, transducers, thermocouples
142 Solenoids, electric actuators
143 Timers, timing motors, delays
144 Synchros
145 Instrument motors, synchronous
146 Data recorders, readouts, indicators, displays, memories
147 Meters, gages
148 Servo motors, stepping motors
149 Other: Motor silencers

15 Circuit Components
150 General
151 Resistors, varistors, rheostats, potentiometers
152 Capacitors
153 Inductors
154 Solid-state devices: Diodes, transistors, thyristors, SCR's, rectifiers, semiconductors, optical couplers, integrated circuits
155 Tubes, cathode ray tubes
156 Saturable reactors, magnetic amplifiers
157 Fuses, fuse panels, protectors
158 Lasers, masers
159 Other

16 Connectors and Wiring
160 General
161 Rings, brushes, commutators, rotors
162 Terminals, binding posts, terminal boards
163 Contacts, button
164 Plugs, receptacles, connectors, sockets
165 Wiring, cable, cord, harness, bus bars, coaxial, circuits, grounding
166 Printed circuits, stitched circuits
167 Superconductors
168
169 Other: Lenses, mirrors, reticles, reflectors, prisms, photosensors

17 Miscellaneous Components
170 General
171 Magnets, electromagnets
172 Chassis, control panels, keyboards
173 Insulation, encapsulation, shielding, jacketing, conduit
174 Cooling elements
175 Lamps, lighting elements, fiber optics, strobes
176 Heaters, heating elements, ovens
177 Electric clutches, electric brakes
178 Ignition systems
179 Other

19 Systems & Assemblies
190 General
191 Amplifiers, preamps
192 Control systems: Regulators, numerical control, digital controllers
193 Electronic computers, calculators, peripheral equipment
194 Microprocessors
195 Adjustable-speed drives
196 Servomechanisms
197
198 Packaging (electrical/electronic)
199 Other

2—FLUID POWER

21 Fluids
210 General
211 Hydraulic fluids
212 Coolants, refrigerants
213 Cleaners, solvents (see 577)
214 Lubricants (see 576)
215
216
217
218 Aerosols, pressurized liquids
219 Other

22 Fluid Conditioners
220 General
221 Fluid storage, pressure vessels, reservoirs
222 Filters, strainers, screens, baffles
223 Renovators (Note, 223 = 222 + 286 + 296)
224 Heat exchangers
225 Coolers, radiators, heat pipes
226 Heaters, burners
227 Driers, evaporators
228 Humidifiers, mixers, carburetors
229 Other

23 Fluid Conductors
230 General
231 Tubing (pressure) (see 587)
232 Hose, ducts, bellows
233 Pipe
234 Fittings
235 Joints, couplings, unions, flanges, adapters
236 Mufflers
237 Hydrofoils
238
239 Other: Applicators, dispensers, reversers

24 Linear Devices
240 General
241 Cylinders, pistons, cylinder mounts
242 Accumulators
243 Intensifiers, boosters, rams
244 Actuators, bellows, diaphragms
245 Pumps
246 Motors
247
248 Compensators
249 Other: Impellers, air guns

25 Rotary Devices
250 General
251 Pumps, rotary, centrifugal
252 Fluid motors, brakes, high-torque low-speed
253 Air motors
254 Compressors
255 Rotary actuators
256 Winches
257 Propellers (see 357)
258 Centrifuges
259 Other

26 Seals
260 General
261 Material seals (O-ring)
262 Mechanical seals
263 Gaskets
264 Wiper rings, piston rings
265 Packings
266 Labyrinths
267
268 Bellows, protective covers
269 Other: Diaphragms, rolling diaphragms, closures, plugs

27 Valves
270 General
271 Directional control
272 Flow control, faucets, flow dividers
273 Pressure control, relief vacuum breakers
274 Servo valves
275 Valve blocks, manifolds
276 Nozzles, venturies, orifices, poppets
277 Proportional flow or pressure
278
279 Other

28 Instruments & Controls
280 General
281 Test stands
282 Control panels
283 Meters, gages: Manometers, flow meters, rotameters, anemometers
284 Switches, liquid level
285 Transducers (to hydraulic)
286 Regulators
287 Fluid logic, fluidics, moving-part logic
288
289 Other: Floats, anchors

29 Systems & Assemblies
290 General
291 Industrial hydraulic & pneumatic systems
292 Mobile, aircraft, marine
293 Hydrodynamic drives
294 Hydrostatic drives
295 Vacuum
296 Lubrication
297 Hydraulic, pneumatic computers
298 Power units
299 Other: Servo systems

3—MECHANICAL

31 Power Sources
310 General, energy
311 Jet engines
312 Internal combustion engines
313 Turbines, turbofans, turbojets
314 Atomic, nuclear power
315 Exotic fuel engines, rockets
316 Fuels, propellants, explosives, coal, natural gas, hydrogen, fuel oil
317 Steam
318 Geothermal, wind, water, solar, tidal
319 Other

32 Constant-Speed Drives & Transmissions
320 General: Speed reducers
321 Chain
322 Belt
323 Friction: Ball, disc, wheel, cone
324 Gear
325
326
327
328
329 Other: Reversing

33 Adjustable-Speed Drives & Transmissions
330 General: Speed reducers
331 Chain
332 Belt
333 Friction: Ball, disc, wheel, cone
334 Gear
335
336
337
338
339 Other: Reversing

34 Drive Components
340 General
341 Transmission chain, cable, cable fittings, cable splices, shackles
342 Belts, belting
343 Gears, gearing, racks, pinions
344 Sprockets
345 Pulleys, sheaves, idlers, tensioners
346 Conveyor chain, conveyor belts
347 Conveyor screws, roller conveyors
348
349 Other

35 Rotational Components
350 General
351 Antifriction bearings: Ball, roller, needle, linear, thrust, pillow blocks
352 Sleeve bearings: Gas, solid-lubricant, bushings, rod ends, ball joints
353 Flexible couplings, universal joints, flexible shafts
354 Torque converters, fluid couplings
355 Shafts, axles, splines, crankshafts, spindles
356 Clutches, brakes, power absorbers, torque limiters
357 Fans, blowers, propellers (see 257)
358 Reels, winches, hoists
359 Other: Flywheels

36 Mechanisms
360 General
361 Cams, cam followers
362 Linkages, cranks
363 Intermittent-motion, periodic-motion, indexing, gyratory-motion, mechanical escapements, ratchets
364 Three-dimensional
365 Motion converters, leadscrews, jacks, actuators
366 Spring motors
367 Telescoping members, collapsing members
368 Manipulators, vibrators, robots, separators
369 Other

37 Controls
370 General
371 Push-pull
372 Transducers (to mechanical)
373 Gyros, gyroscopes
374 Mechanical counters
375 Safety devices, audible warning devices
376
377
378
379 Other

39 Systems
390 General

4—ASSEMBLY COMPONENTS

41 Fasteners
410 General
411 Inserts
412 Nuts, locknuts
413 Pins, dowels, staples
414 Quick operating panel-type, latches
415 Retaining rings, keys, collars, frictional shaft connectors, shaft-hub connectors, tolerance rings
416 Rivets, blind rivets
417 Screws, bolts, studs, shear bolts
418 Washers, grommets, eyelets, spacers, bushings, stand-offs
419 Other: Spring clips, clamps, zippers, wire ties, belt splicing, captive panel hardware, captive fasteners

42 Springs and Isolation Devices
420 General
421 Fluid & air springs
422 Helical wire springs
423 Leaf springs, cantilever
424 Vibration isolators, mounts
425 Hydraulic-damping devices, shock absorbers, snubbers
426 Mechanical damping devices
427 Spring-loaded devices
428
429 Other: Belleville, constant force

43 Miscellaneous
430 General
431 Locks
432 Nameplates, labels, wire markers, signs
433 Dials, knobs, handles, drawer pulls
434 Shims
435 Enclosures, housings, cabinets, cases
436 Wheels, tires, rollers, casters, ball transfers, rings
437 Slides, ways
438 Hinges, brackets
439 Other: Razor blades, brushes, bells, knives, buzzers, chimes, bases, boots, bellows, way protectors

44 Mechanical Measurement Equipment
440 General
441 Inspection tools and fixtures
442 Gage blocks, micrometer heads
443 Meters, gages

5—MATERIALS

51 Ferrous Metals
510 General
511 Cast iron, malleable iron, cast carbon, alloy steels
512 Wrought carbon, alloy steels
513 Free-machining steels
514 Stainless steels, high alloys, high temperature steels
515 Specialty steels (tool, die, electrical)
516
517 High-strength low-alloys
518 Magnetic alloys
519 Other

52 Nonferrous Metals
520 General
521 Aluminum
522 Copper, brass, bronze, beryllium copper
523 Magnesium
524 Nickel
525 Titanium
526 Zinc
527 Refractory metals: Tungsten, tantalum, molybdenum, columbium
528 Precious metals
529 Other: Tin, lead, chromium, vanadium

53 Plastics
530 General
531 Thermoplastic plastics (nylon, Teflon)
532 Thermosetting plastics (epoxy, phenolic, filled silicones, rigid urethanes)
533 Laminated plastics, vulcanized fiber
534 Reinforced, filled plastics
535 Porous plastics
536 Colors for plastics
537 Plastic trims
538
539 Other: Degradable

54 Rubber and Elastomer
540 General
541 Natural rubber
542 Synthetic rubber
543 Elastomeric plastics: Flexible silicones and urethanes
544 Hard rubber
545
546
547
548
549 Other

55 Joining Materials
550 General
551 Adhesives, sealants, encapsulants, caulking, grout
552 Welding rods
553 Brazing, soldering alloys
554
555
556
557
558
559 Other

5—Materials (continued)

56 Other Nonmetals
560 General
561 Carbon, graphite, diamonds
562 Glass, ceramics, quartz
563 Refractory materials, mica
564 Carbides, cermets
565 Mineral and synthetic fibers, felt, fabrics
566 Insulating materials (thermal, sound)
567 Wood, cork, composition board, paper
568 Chemicals, phosphors, inks
569 Other: Abrasives, friction materials, synthetic crystals, heat-sensitive liquid crystals

57 Finishes, Coatings & Lubricants
570 General
571 Metallic coatings
572 Chemical coatings, electrochemical coatings, photosensitive
573 Organic finishes: Lacquers, synthetic enamels, paints, varnishes
574 Porcelain enamels, vitreous coatings
575 Plastic coatings, plastic powders
576 Lubricating materials (see 214)
577 Cleaners, solvents (see 213)
578 Mechanical surface finishes
579 Other: Corrosion inhibitors

58 Prefabricated Forms
580 General
581 Film, tape, sheet, foil, plate
582 Wire, wire cloth, knitted wire mesh, wire rope, cable
583 Patterned, perforated, expanded metals, textured, prefinished
584 Laminates
585 Composite materials
586 Structures: Honeycomb, foam, sandwich, isogrids, geodesic
587 Structural shapes: Tubing, channels
588 Balls, beads
589 Other

6—MANUFACTURING PROCESSES

61 Metal Casting
610 General
611 Sand
612 Shell mold
613 Permanent mold, gravity, low-pressure
614 Centrifugal
615 Investment
616 Die
617 Plaster mold
618 Continuous
619 Other

62 Metal Shaping
620 General
621 Forging, cold forging
622 Extrusion, impact extrusion
623 Heading, upsetting, cold forming
624 Thread, form rolling
625 Powder metallurgy, porous metals, fiber metals
626
627
628 Hot isostatic pressing
629 Other

63 Metal Forming
630 General
631 Sheet forming, plate forming
632 Stamping, drawing, blanking, embossing, coining
633 High-velocity forming, explosive forming
634 Spinning
635 Roll forming
636 Tube forming
637 Wire forming
638 Stretch and compression forming
639 Other: Magnetic forming

64 Metal Joining
640 General
641 Arc welding
642 Gas welding
643 Resistance welding
644 High-energy welding: Plasma, electron beam, explosive bonding, ultrasonic, magnetic, solid state
645 Flame cutting
646 Brazing
647 Soldering, desoldering
648 Adhesive joining, bonding
649 Other: Interlocking, keylock, dove-tail, sewing, bolted joints, riveting

65 Metal Removal
650 General
651 Planing, broaching
652 Lathe turning, screw machining
653 Milling, hobbing, gear shaping, sawing
654 Drilling, boring, tapping
655 Grinding, abrasive machining
656 Honing, lapping, polishing, burnishing
657 High-energy machining: Spark, laser, water jet
658
659 Other

66 Metal Treating
660 General
661 Heat treating
662 Surface treating: Carburizing, nitriding
663 Shot peening, surface working
664 Chemical milling, etching, photochemical machining
665
666
667
668
669 Other

67 Finishing
670 General
671 Chemical, solvent cleaning
672 Mechanical finishing, tumbling
673 Conversion coating, anodizing, electropolishing
674 Electroplating, vacuum metallizing
675 Metal spraying, flame spraying, hard facing, plasma spray, plasma arc, electrostatic
676 Painting
677 Hot stamping: Branding
678
679 Other

68 Plastics & Rubber Processes
680 General
681 Molding, injection molding, forging, rotational molding
682 Extrusion, pultrusion
683 Sheet forming
684 Laminating
685 Casting
686 Stamping, machining, fabricating, forming, forging
687 Calendering, coating, plating
688 Encapsulating
689 Other: Filament winding, welding

69 Miscellaneous
690 General
691 Assembly, automatic assembly, micro-assembly
692 Packaging, storage, shipping
693 Balancing rotating machines

7—DESIGN THEORY & TECHNIQUES

71 Mechanics
710 General
711 Statics (at rest)
712 Dynamics (force to create motion)
713 Kinematics (motion in abstract)
714 Vibration, natural frequency
715 Shock
716 Noise, sound, music
717 Viscosity
718 Strain and stress
719 Other

72 Strength of Material
720 General
721 Elastic theory
722 Plastic theory
723 Fatigue, endurance
724 Creep
725 Impact stress
726 Thermal stress
727 Friction, wear
728 Fracture
729 Other: Hardness

73 Strength of Parts
730 General
731 Tension, compression
732 Bending
733 Shear, torsion
734 Surface contact stress
735 Plates
736 Cylinders, columns
737 Rotating discs, rotors
738 Critical speed, critical flow
739 Other

74 Human-Factors Engineering
740 General
741 Styling
742 Color
743 Safety, comfort, protective clothing
744 Illumination
745 Human limitations
746 Spare/replacement parts
747
748
749 Other: Tactile graphics

7—Design Theory & Techniques (cont.)

75 Design Analysis & Synthesis
750 General
751 Mathematical methods, statistics
752 Graphical techniques
753 Analogs, models, simulators
754 Computer techniques
755 Reliability, quality control
756 Dimensioning, tolerances
757 Maintenance
758 Value analysis
759 Other

76 Basic Sciences & Fields
760 General
761 Physics
762 Chemistry
763 Thermal, thermodynamics, cryogenics, heat transfer, combustion
764 Radiation
765 Biosciences
766 Optics, photography, holography, photoelasticity
767 Ultrasonics
768 Aerodynamics
769 Other: Economics, metrology

77 Experimental Design
770 General
771 Prototypes, breadboards
772 Testing, stress analysis
773
774
775
776
777
778
779 Other

78 Environmental Design
780 General
781 Corrosion, rust
782 Mold, fungus
783 Outer space
784 Under sea
785 Pollution
786 Waste treatment, reclamation, salvage, restoration, conservation, recycling
787
788 High temperature, low temperature
789 Other

8—ENGINEERING MANAGEMENT & OPERATION

81 Engineering Department Operations
810 General
811 Structure, organization
812 Costs, budgets
813 Programming, planning
814 Personnel policies
815 Recruiting, evaluation, training
816 Managerial talent
817 Compensation, pensions
818 Communication
819 Other

82 New Product Development
820 General

83 Drafting & Reproduction
830 General
831 Management, control systems
832 Drafting practices, techniques
833 Technical illustration
834 Drafting equipment
835 Reproduction equipment, systems
836 Furniture, drawing files
837
838
939 Other

84 Laboratory & Testing
840 General
841 Nondestructive testing
842 Dynamic analysis

85 Technical Information
850 General
851 Engineering libraries, files, books, museums
852 Information classification, retrieval
853 Specifications, standards, metrication
854 Report writing, articles, papers, oral
855 Part numbering, part names (nomenclature)
856 Engineering records
857
858 Security, protection
859 Other

86 Patents & Patent Law
860 General

87 Personal & Professional
870 General
871 Creativity, inventiveness
872 Meetings, shows
873 Contests, awards
874 Societies
875 Professional licensing, certification
876 Unions
877 Education, curriculums, seminars, career planning
878 Product litigation, expert witness
879 Other: Women

88 Outside Services
880 General
881 Engineering design services
882 Industrial design services
883 Consulting to government
884
885
886
887
888
889 Other

9—MISCELLANEOUS

91 Complete Machines
910 General
911 Ordnance: Tanks, missiles, rockets, ammunition (SIC 19)
912 Machinery: Agricultural, construction, machine tools, office machines, materials handling (SIC 35)
913 Electrical machinery: Communication, radio, radar, TV, appliances, X-ray (SIC 36)
914 Transportation: Automotive, aircraft, ships, railroad, spacecraft, undersea craft (SIC 37)
915 Instruments: Medical, dental, photographic, watches (SIC 38)
916 Fabricated metal products: Hand tools (SIC 34)
917 Toys, playground equipment, sports equipment, recreational equipment
918
919 Other

99 Unclassified
990 General